

cooperation of J. Wislicenus for estimating the amount of albumin expended in physical work such as mountain climbing. The result, that the material used in muscular work must be free from nitrogen, was at once generally accepted. The results of investigations on the peptones, upon what becomes of them in the circulation of the blood, on the action of pepsin, and on the value of various nutritive substances, were made public from time to time in lectures for which Fick prepared and demonstrated very numerous and laborious experiments.

The students' manuals which Fick wrote are distinguished by their lucid exposition, clear style and critical discussion. His first book, entitled "*Die medicinische Physik*," was written when he was in his twenty-seventh year, and passed through three editions. This book at once secured for the young author a place in the front rank of the physiologists of the day. Of the "*Kompendium der Physiologie*" four editions appeared, the last in the year 1892.

As early as 1862 he published a "*Lehrbuch der Anatomie und Physiologie der Sinnesorgane*" as part of a larger compilation. To Hermann's "*Handbuch*," already mentioned, he furnished two elaborate articles on physiological optics.

From the physiological laboratory at Zürich in the year 1869, and from the Würzburg Institute in the years 1873 to 1878, there appeared the "*Physiologische Untersuchungen*" (four issues). From 1852 and onwards for fourteen years he was one of the contributors to Canstatt's "*Jahresbericht*" on the literature of physiology.

Of the remarkable talents and training that enabled him, for instance, to deliver experimental lectures on physics during the vacancy of the chair of physics, he also gave evidence by his own productions as investigator and writer in this branch of science. Best known is his work on hydro-diffusion in Poggendorff's *Annals*. The fundamental conceptions of mechanics, and the insight gained into these by means of the mechanical theory of heat, were favourite subjects of his speculation. A brief enumeration must suffice here of the titles of the most characteristic of the treatises that fall under this head, and many of which lie in the borderland between physics and pure philosophy:—

"*Ueber die der Mechanik zu Grunde liegenden Anschauungen*," "*Ueber die Zerstreuung der Energie*," "*Versuch einer physischen Deutung der kritischen Geschwindigkeit in Weber's Gesetz*," "*Ueber Druck im innern von Flüssigkeiten*." The following treatises belong more to the philosophical side:—"Die Naturkräfte in ihrer Wechselwirkung," "*Die Welt als Vorstellung*," "*Philosophischer Versuch ueber die Wahrscheinlichkeit*," "*Die stetige Raumerfüllung durch Masse*," &c.

Even this slight sketch of Fick's literary activity will show how comprehensively he mapped out for himself the sphere of his work and how exhaustively he laboured in it. But he was also unusually well equipped in all other departments of human knowledge. He was extraordinarily learned and well read. In accordance with his own definition of an educated man as one who is capable of taking a comprehensive view of the most characteristic results furnished by the intellectual work of the whole of mankind, Fick studied and mastered a very widely embracing province of knowledge. He was assisted in his efforts by a particularly accurate memory, which he retained unimpaired to the last.

Conspicuous among Fick's talents was his critical faculty. He dealt with the first principles of the science of mechanics in an unusually clear and distinct way, and when a series of novel conceptions was put before him he was able to correctly analyse and estimate them. He was recognised by those who knew him as a scientific critic by vocation. He was aided in his experimental work by great manual dexterity. He prided himself upon belonging to the school of Bunsen, and in the construction

of the various instruments which he introduced followed Bunsen's method by himself putting together out of simple materials the first models of new scientific apparatus. It is an interesting fact that Fick warmly espoused the cause of total abstinence, and was himself for the last decade of his life a total abstainer.

NOTES.

M. AMAGAT has been elected a member of the section of physics of the Paris Academy of Sciences, in succession to the late Prof. Cornu.

MR. MARCONI brought forward two interesting pieces of information in his lecture at the Royal Institution last Friday. The first relates to the new form of magnetic detector which he has been employing in place of the coherer. The instrument is found to be more sensitive and trustworthy than the coherer, and gives promise of a great increase in the speed of working. Already a speed of thirty words a minute has been attained, and this may possibly be increased to several hundred. The second point relates to the recent Transatlantic signalling. It seems that on the occasion of Mr. Marconi's journey across the Atlantic in the *Philadelphia*, the signals transmitted during the day failed entirely at a distance of 700 miles, although a message was successfully sent at night more than 1550 miles, and a signal more than 2000 miles. This effect Mr. Marconi suggests may be due to the diselectrification of the aerial wires by the daylight. The difficulty can, however, be got over by the use of greater transmitting power—as is evidenced partly by the fact that the signal received at Newfoundland was transmitted during the daytime. The Canadian station, for the erection of which Mr. Marconi was liberally subsidised by the Canadian Government, will be open shortly for experiments. The rest of the lecture gave an interesting *résumé* of the work already accomplished, but contained nothing which will be new to those who have followed its progress.

THE eighty-third meeting of the Société Helvétique des Sciences Naturelles will be held at Geneva on September 7-10. M. E. Sarasin is the president of the society, M. Marc Micheli and Prof. R. Chodat vice-presidents, M. Maurice Gauthier and M. A. de Candolle secretaries, and M. A. Pictet treasurer. Correspondence referring to the forthcoming meeting should be addressed to M. de Candolle, Cour de St. Pierre, 3, Geneva.

IN accordance with previous announcements, the autumn meeting of the Iron and Steel Institute will be held at Düsseldorf on September 3-4. The directors of the Nord-deutscher Lloyd have generously offered to the members attending the meeting complimentary first-class passages, including table, to the number of 250, by the s.s. *Kronprinz Wilhelm*, upon that ship's homeward voyage (from New York) to Bremen, on September 1, from Plymouth. The provisional programme of the meeting is as follows:—On Tuesday, September 2, the members will arrive at Düsseldorf. On September 3 the president, council and members will be received by the civic authorities and by the reception committee in the Municipal Concert Hall (*Städtische Tonhalle*). A selection of papers will subsequently be read and discussed. In the afternoon a visit will be paid to the Düsseldorf Exhibition, for the purpose of examining the various sections of mining, metallurgy and machinery. In the evening the members and ladies accompanying them will be invited by the Mayor and Corporation of Düsseldorf to a *conversazione* and concert. On September 4 the morning will be devoted to the reading and discussion of papers, and the afternoon to visits to the exhibition and to works in the immediate vicinity. In the evening the reception committee will entertain the visitors at a banquet.

On September 5 the whole day will be devoted to visits to works. In the evening the exhibition grounds will be specially illuminated in honour of the Institute. On September 6 there will be an excursion to the picturesque district of Vohwinkel, to the Elberfeld suspended railway and to the Kaiserbridge, near Müngsten. A detailed programme will be issued when the arrangements are further advanced.

ON June 14 the Essex Field Club visited those portions of the old Lambourne and Hainault Forests which, according to the scheme proposed by Mr. E. N. Buxton, are to be re-afforested and to become an open space for London second only in importance to Epping Forest. It is proposed to make free some 859 acres, of which seventy are detached from the main portion. These form Grange Hill Forest, and the purchase of them for 7000*l.* is now assured. For the rest, 20,000*l.* is asked. It is hardly necessary to point out the importance from a natural history point of view which the grounds will possess if they become public property. Not only will the naturalist find happy grounds for study, but others who feel the necessary primness of London parks will be able to enjoy nature less adorned.

QUEENWOOD COLLEGE, near Stockbridge, Hants, was destroyed by fire on June 10, Mr. Charles Willmore, the principal, meeting his death in the disaster. Several distinguished men, both in Mr. Willmore's time and in that of his predecessor, Mr. George Edmondson, made their temporary home at Queenwood. Prof. Fawcett, Postmaster-General and political economist, was a scholar there; and in the roll of its science masters we find the names of Tyndall, Frankland, Debus, Field and Hake. There have been few schools in this country in which the pursuit of science was more earnestly and heartily encouraged. It is now about seven years since the college, as such, ceased to exist.

DURING a trial with a French naval balloon off Toulon on June 9, Lieut. Baudic, who was alone in the car, was thrown into the sea and drowned. The object of the ascent was to ascertain whether it is possible, from the car of a balloon, to perceive submarine boats at a distance of a mile or so. The balloon started from the Maritime Aeronautical Works established in 1890 at Garrouban. The Garrouban Aeronautical Station is provided with two balloons, the *Auxiliare*, and a larger one measuring 500 c.m. capable of carrying three persons, called the *Normal*. These marine balloons are intended to be sent up captive from a large warsteamer for inspecting the surrounding sea and sending up signals at a distance.

WE learn from *Science* that at the recent annual meeting of the American Academy of Arts and Sciences it was decided to award the "Rumford premium" to Prof. George E. Hale, of the Yerkes Observatory, "for his investigations in solar and stellar physics, and in particular for the invention and perfection of the spectro-heliograph." It was also resolved to grant the sum of 750 dollars from the income of the Rumford fund to be expended for the construction of a mercurial compression pump designed by Prof. Theodore W. Richards and to be used in his research on the Thomson-Joule effect. A grant from the Rumford fund was also made to Prof. Arthur A. Noyes in aid of his research as to the effect of high temperatures upon the electrical conductivity of aqueous solutions.

THE *Times* reports that the jubilee festival of the Germanic Museum at Nuremberg was celebrated on Monday in the presence of the German Emperor and Empress and members of the Royal Houses of Bavaria, Baden and Württemberg. The collections in the museum illustrate every aspect of the growth of the Germanic peoples; special collections, for example, have been formed to illustrate the development of the trade guilds and of characteristic German industries, such as the Bavarian

breweries. From a collection of antiquities in the narrow sense of weapons, heraldic devices and the like, the museum has grown into a complete historical exhibition.

DURING the researches of the seventh expedition of the Liverpool School of Tropical Medicine, which visited the Gambia in the summer and autumn of last year, a new parasite associated with symptoms resembling those occurring in animals suffering from the tse-tse fly disease was found in the blood of a native child. The committee of the school has now resolved to despatch a new expedition to the Gambia and to Senegambia to study the disease further. The expedition, which will start in a few weeks, will, as at present organised, consist of Dr. J. Everett Dutton and Dr. J. L. Todd, of McGill University, Montreal. Its principal object will be to investigate the conditions under which the disease occurs in both Europeans and natives and its distribution, and also to ascertain how it is conveyed from man to man.

AMONG the subjects discussed at the annual meeting of the Sea Fisheries Committees of England held in London on June 10 and presided over by Mr. Gerald Balfour were the establishment and maintenance by the Government of one or more laboratories for carrying on the work of fishery research, or, failing that, the provision from Imperial resources of the funds necessary to render more efficient and useful the laboratories which at present exist. Mr. Gerald Balfour, in welcoming the delegates, said some of the subjects discussed last year, such as the registry, lettering and numbering of fishing boats, had been carried out; and the artificial fertilisation of ova had been referred to the Committee on Ichthyological Research now sitting, as was also the establishment and maintenance of laboratories and hatcheries.

IN the popular mind, the medical and other sciences are regarded as too severely precise to have romantic aspects, yet in the history of scientific discovery records can be found of many noble deeds and sacrifices for the sake of others. Sir Frederick Treves referred to the romance of medicine in an address at the Charing Cross Hospital Medical School on June 11. He remarked that the exploits of discoverers of new countries had always been surrounded with a halo of romance, but the discoveries in medicine had not been less romantic. No story of the past could exceed the romance of the history of the work of Pasteur, Lister and Koch. They had not discovered any new garden of the Hesperides, but they had travelled far into the valley of the shadow of death. He did not think there was anything in the history more tragic than the account of Laënnec holding on the point of a needle a minute scrap of tissue and saying "I have found the seed of tuberculosis." When Koch demonstrated the bacillus of tuberculosis he was practically reaching one of the limits of philosophic inquiry. Could there be anything more profoundly interesting than the way in which malaria was studied and finally explained?

SEVERAL matters of meteorological interest have been recorded during the past few days. The drought in Australia came to an end at the beginning of last week, when good rains occurred in portions of South Australia, New South Wales and Victoria. Less hopeful news comes, however, from India, for an Exchange telegram from Simla states that the official monsoon forecast, which this year for the first time is withheld from the public, foreshadows a deficient rainfall all over India and drought in Gujerat and Western Punjab. At Karachi, however, a terrific storm occurred on Monday. The *Daily Mail* states that the city is half submerged by extraordinarily high tides. Telegraphs and telephones have all been destroyed, and there has been serious loss of life and property. Exceptionally stormy weather is also being experienced in South Africa. At Middleburg,

Cape Colony, for the first time for sixteen years, the town was covered with deep snow on June 11. Storm and cold are general throughout the Colony. The cold is unprecedented, and thousands of cattle and sheep have perished. In many places the telegraph poles are buried beneath snowdrifts. A very severe snowstorm swept over the midland districts of Cape Colony on June 14. Trains were blocked at Naauwpoort by a snowdrift 6 feet in depth, and much difficulty was experienced in clearing the lines. Heavy falls of snow also occurred in other parts of the country.

THE annual report of the Decimal Association records that lately there has been a very decided growth of public opinion in favour of the compulsory adoption of the metric weights and measures throughout the British Empire. There are warm supporters of the reform in Canada, Australia, Cape Colony and India, and efforts will be made to bring the question before the Conference of Colonial Premiers to be held at the time of the Coronation. British consuls abroad, residing in countries where the metric system is in use, continue to dwell upon the importance of the change being made from our present confused and complicated weights and measures to those of the metric system. The Committee on Decimal Coinage appointed by the Federal House of Representatives for Australia issued its report in April recommending the adoption of decimal coinage. The report of this committee concluded with a recommendation that the Commonwealth should cooperate in any movement for the decimalisation of the weights and measures of the Empire. Quite recently the Association of Trade Protection Societies of the United Kingdom passed the following resolution at its annual meeting:—"That this meeting is of opinion that the time has now arrived when the decimal system of coinage and the metric system of weights and measures should be compulsorily adopted throughout the British Empire."

AMERICA has just furnished a new high-speed record, which has been attained on the Burlington and Missouri Railroad. The train (says *Feilden's Magazine* for June) consisted of nine cars, namely, a mail car, a luggage car, two reclining chair cars, three sleeping cars, dining car and a private car, and the engine (B. and M. R. No. 41) was of the ten-wheeled type with 6-feet driving wheels. The section over which the record was taken was between Eckley and Wray, Colorado, separated by a distance of 14.8 miles, which was "covered in exactly nine minutes, that is, the train was travelling at the rate of 98.66 miles per hour for the whole section." It is stated that the time was correctly tallied by five separate chronographs, and may therefore be considered trustworthy.

IN the *Jahrbuch der k.-k. geol. Reichsanstalt* (Band li. Heft 1), Herr Lukas Waagen contributes a detailed account of the Jurassic *Avicula* (*Oxytoma*) *inaequivalvis* and its allies. This paper will be welcomed by all who may have occasion to study this very variable and difficult group of shells. The author supplies a comprehensive synonymic list, and concludes that the numerous specific separations in this group, proposed by various authors, are in reality unwarranted.

A SCORE of new forms of fossil ear-bones of fishes, from the Tertiary strata of Austro-Hungary, have been described by R. J. Schubert (*Jahrbuch der k.-k. geol. Reichsanstalt*, Band li. Heft 2). These otoliths are for the most part referred to *Umbriina*, *Corvina*, *Sciænidarum* and *Sciæna*, and were obtained in Pliocene deposits at Brunn am Gebirge and in Miocene beds at several other localities. Some appear to indicate relationship with recent Mediterranean forms, while others have their nearest allies in the Oligocene and Miocene of Germany and in the older Tertiaries of North America. The paper is well illustrated.

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IN a memoir on the flora of Thibet or high Asia Mr. Botting Hemsley, F.R.S., has compiled an account which brings out vividly the unique conditions of altitude and climate. The data for the subject-matter are obtained from collections deposited in the herbarium at Kew. Amongst the peculiarities of the vegetation may be noted the scarcity of certain types of plants, e.g. annuals, succulents and bulbous plants (except *Allium Semenovi*, which is widely distributed). Woody plants, too, are rare and poorly developed.

WE have received the Report of the South London Entomological and Natural History Society for 1901.

THE most interesting item in the Report of the Albany Museum for the year 1901 is the identification among the collection of a pair of horns of the blaauwbok (*Hippotragus leucophaeus*), an antelope formerly found in the neighbourhood of Cape Town which has been extinct for considerably more than a century. The horns were entered in one of the old catalogues as belonging to the animal in question; assuming the identification to be correct, the specimen appears to be the only known relic of the blaauwbok remaining in South Africa.

IN the *American Naturalist* for May, Prof. H. F. Osborn further elaborates his views as to the "law of adaptive radiation" among mammals. One result of his investigations is to explode the old idea that it is possible to reconstruct an extinct animal from either a claw or a tooth. Correlation is not, as Cuvier supposed, morphological, "but physiological, function always preceding structure. It becomes closest when teeth and feet combine in the same function, as in the prehensile canines and claws of the Felidæ, and most diverse where the functions are most diverse, as in the teeth and paddles of the Pinnipedia."

VOL. liii. of the *Anales* of the Scientific Society of Argentina contains a long memoir, by Señor A. Gallardo, of the late Dr. C. Berg, director of the museum at Buenos Aires. From this it appears that Berg was born at Tuckum, Curlandia, Russia, in 1843, and that, after much good work in his native country, he first visited Argentina in 1873. Here, under the auspices of Burmeister, he worked at the entomology and botany of the country assiduously for nearly two years, when he was appointed professor of zoology at Cordoba. This appointment, however, he held but two months, as in March, 1875, he was elected to the chair of natural history at the National College of Buenos Aires, in succession to Dr. J. Ramorino. In 1890 he was specially entrusted with the reorganisation of the National Museum at Monte Video, and on the death of Burmeister in 1892 he succeeded to the directorship of the National Museum at Buenos Aires, a post which he held until his own death. Berg's work covered a very wide field both in zoology and botany, and an appendix to the memoir before us contains a very long list of papers of which he was the author. One of his latest contributions proved the distinctness of the smaller form of mara, or Patagonian cavy, the *Dolichotis salinicola* of Burmeister. He is succeeded in the directorship of the museum by Dr. Florentino Ameghino, so well known on account of his remarkable contributions to the history of the extinct vertebrate fauna of Patagonia.

CURIOUS if true must be the verdict in regard to a paper contributed by Prof. William Patten to the May issue of the *American Naturalist* on the structure and classification of the Tremataspidae. This family is represented by a single genus and species (*Tremataspis schrenki*), all the known remains of which have been obtained from the Lower Silurian of a small pit at Rootsikuelle, in the Isle of Oesel, in the Baltic. These remains consist chiefly, if not entirely, of more or less imperfect examples of the dorsal shield. Although Tremataspis has always been classified with primitive vertebrates like

Cephalaspis and Pteraspis, the curious resemblance presented by its shield to the carapace of the modern crustacean commonly known as Apus has long been recognised. This resemblance, the author contends, is not a mere accident, but indicates genetic affinity between the two groups. Accordingly, he proposes to regard Tremataspis, Pteraspis, Cephalaspis and Pterichthys as the representatives of a new class of arthropod-like animals under the title of Peltacephalata. And he urges that the genetic relationship between this group and the arthropods "can mean nothing else than the derivation, through changes in structure and function, of the one group from the other." A further proposal is to group together into one great phylum the vertebrates and the arthropods under the name of Syncephalata. It will be interesting to note what the authors' fellow-workers have to say in regard to this startling new departure in classification.

To the April number of the *Ibis*, Mr. W. E. Clarke communicates an account of a month spent by himself last autumn on the Eddystone for the purpose of observing bird-migration. On the night of October 12 the author was fortunate enough to witness a great "rush" of emigrating birds, which continued until the early hours of the 13th. Although the majority of the migrants were British, the presence of the red-wing and the fieldfare indicated a foreign contingent, and it was also noted that the starlings taken on this occasion belonged to the race characterised by the purple head and green ear-coverts, which is believed to be continental in habitat. "Throughout the movement, and especially when it was at its height in the earliest hours of the morning," writes Mr. Clarke, "the scene presented was singular in the extreme and beyond adequate description. Resplendent, as it were, in burnished gold, hosts of birds were fluttering in, or crossing at all angles, the brilliant revolving beams of light; those which simply traversed the rays were illumined for a moment only, and became mere spectres on passing into the gloom. The migrants which winged their way up the beams—and they were many—resembled balls or streaks of approaching light, and they either struck the lantern, or, being less entranced, passed out of the rays ere the fatal goal was reached. Of those striking, some fell like stones from their violent contact with the glass, while others beat violently against the windows in their wild efforts to reach the focal point of the all-fascinating light."

THE skeleton and skin of the okapi recently received at the Congo Museum, Brussels, add important information to our knowledge of that animal. The specimens have been submitted to Dr. Forsyth Major, who published a preliminary note on the results of his examination in *La Belgique Coloniale* of May 25, and also gives a figure of the male skull in the same journal of June 8. The Brussels specimens comprise the skeleton of a male, unfortunately lacking two of the vertebrae of the neck, and the skin of a female, both belonging to adults. These show that full-grown individuals of both sexes are provided with horns. Those of the female are comparatively small, conical, nearly vertical and completely covered with skin. Those of the male, on the other hand, are larger, subtriangular and inclined somewhat backwards, each being capped with a small polished epiphysis, which appears to have projected through the skin investing the rest of the horn. As regards its general characters, the skull of the okapi appears to be intermediate between that of the giraffe on the one hand and that of the extinct Palæotragus, or Samotherium, on the other. It has, for instance, a greater development of air-cells in the *diploe* than in the latter, but a much smaller one than in the former. Again, in Palæotragus the horns (present only in the male) are situated immediately over the eye-sockets, in Ocapia they are placed just behind the latter, while in Giraffa they are partly on the parietals. In general

form, so far as can be judged from the disarticulated skeleton, the okapi was more like an antelope than a giraffe, the fore and hind cannon-bones, and consequently the entire limbs, being of approximately equal length. It is further suggested that, owing to the skin having been unduly stretched in drying, the neck and fore-limbs of the immature mounted specimen in the British Museum may be somewhat too long. From all this it seems probable that Palæotragus and Ocapia indicate the ancestral stock of the giraffe line; while it is further suggested that the apparently hornless Helladotherium of the Grecian Pliocene may occupy a somewhat similar position in regard to the horned Sivatherium of the Indian Siwaliks.

THE second volume of the *Minnesota Botanical Studies* is completed with the issue of the May number. Mr. Bruce Fink contributes an article dealing with the lichens of north-western Minnesota. The *Corallinae verae* of Port Renfrew, Vancouver Island, B.C., form the subject of a short systematic account by Mr. K. Vendo. The concluding paper, by Prof. Conway Macmillan, deals with the anatomical investigation of *Pterygophora californica*, one of the Laminariaceae.

IN the first quarterly *Bulletin* for this year issued by the Botanical Department at Trinidad will be found an account of some experiments the results of which promise to be of value to cacao planters. Attempts have been made to graft cacao plants on strong stocks, in the hope that liability to the attacks of fungi may be reduced. So far, successful grafts on *Theobroma bicolor* and *Herrania albiflora* have been obtained, and trials are being made with stocks of *Cola acuminata*. Another somewhat novel experiment is in progress of treating the soil with mulchings of vegetable matter during the dry season. This serves to attract earthworms, and they act as carriers of manure to the roots of the cacao plants. Attention is also drawn to the advantages of using chupons or gormandisers on the plantations.

IN the report for last year, issued from the Royal Botanic Gardens, Ceylon, Mr. J. C. Willis, the director, gives further proof of his capability as an organiser and investigator. To aid in purely scientific work he has the assistance of four experts—a mycologist, a chemist, an entomologist and an assistant. Besides investigating the diseases of tea and cacao plants, experiments have been made with other plants which may prove to have an economic value. While so far no industry of a first-class nature has been brought to light, several minor industries which may be undertaken on existing plantations have been instituted. Hevea plants now under cultivation have yielded rubber superior to the best wild Para. Indigenous species of Palaquium were investigated by the assistant, and rubber of fair commercial value was obtained; this, too, without cutting down the tree. Camphor, citronella oil, cinchona, coca have also been brought to the notice of planters. The laboratory at Peradeniya has been well patronised by English and foreign visitors, and with the establishment of a laboratory and rooms at Hagkala facilities are offered for research in the hill country. The director has completed his review of the flora of the Maldive Islands, and has published it in the new journal, the *Annals* of the Royal Botanic Gardens, Peradeniya.

WE have received a copy of the fifth volume of the *Transactions* of the Inverness Scientific Society and Field Club. It embodies the work of four sessions, ending with the summer of 1899, but there is appended a summary of Dr. John Horne's address to the geological section of the British Association in 1901. Some time has therefore elapsed since the reading of the papers now published, which deal with history and archæology as well as natural history, physics and engineering.

There is a suggestive paper by Dr. Mackie, of Elgin, on "The Felspars present in Sedimentary Rocks as Indicators of the Conditions of Contemporaneous Climate."

MESSRS. J. J. GRIFFIN AND SONS, LTD., have issued a new edition of their illustrated catalogue of chemical apparatus and reagents published under the title "Chemical Handicraft." Hints on manipulation of instruments and arrangement of apparatus are occasionally given, and they assist in making the volume a useful catalogue for chemical laboratories and technical schools.

NEW and revised editions have been received of several well-known scientific books. The fourth edition of Prof. Grenville Cole's "Aids to Practical Geology" has been published by Messrs. C. Griffin and Co. The book is the most helpful guide which the student who desires to become intimately acquainted with the characters of rocks and minerals could possess. It is not intended to take the place of a field geology, but to show how every specimen obtained may be minutely examined in the laboratory or study, and its place among rocks or fossils understood. Work of this kind is practical geology in as scientific a sense as observations in the field.—Messrs. Cassell and Co. have published a popular edition of Mr. Richard Kearton's interesting book "With Nature and a Camera." The 180 pictures reproduced from photographs by Mr. Cherry Kearton have given pleasure to many outdoor naturalists.—The valuable textbook of "Agricultural Botany," by Prof. J. Percival, published by Messrs. Duckworth and Co. and reviewed in these columns in October, 1900 (vol. lxii. p. 570), has reached a second edition. It is satisfactory to know that students of agriculture are using a book in which plant structure and growth are dealt with scientifically.—The eighth edition of "Astronomy with an Opera Glass," by Mr. G. P. Serviss, has been published by Messrs. Hirschfeld Brothers, Ltd.—A new edition of Prof. J. G. Macgregor's "Elementary Treatise on Kinematics and Dynamics" has been published by Messrs. Macmillan and Co., Ltd. Few changes have been made, and the book retains its character as a comprehensive treatise in which the whole subject is treated systematically, without reference to the requirements of examining bodies.

THE additions to the Zoological Society's Gardens during the past week include a Dusty Ichneumon (*Herpestes pulverulentus*) from South Africa, presented by Capt. A. Perkins; two Larger Egyptian Gerbilles (*Gerbillus pyramidum*) from North Africa, presented by Col. Momber; a Buffon's Touracou (*Turacus buffoni*) from West Africa, presented by Capt. H. A. Thorne; two Long-tailed Whydah-birds (*Chera progne*) from South Africa, presented by the Rev. R. Armitage; a Richardson's Skua (*Stercorarius crepidatus*) European, presented by Lt.-Col. L. H. Irby; a Sykes's Monkey (*Cercopithecus albigularis*), a Grant's Gazelle (*Gazella granti*), a Banded Ichneumon (*Crossarchus fasciatus*), a Vulturine Guinea Fowl (*Acryllium vulturinum*), a Bateleur Eagle (*Helotarsus ecaudatus*), three White-winged Whydah-birds (*Urobrachya albonotata*) from East Africa, a Buffon's Touracou (*Turacus buffoni*), a Red-faced Weaver-bird (*Foudia erythrops*), seven Orange Weaver-birds (*Euplectes franciscana*), two Pintailed Whydah-birds (*Vidua principalis*), three Paradise Whydah-birds (*Vidua paradisaea*) from West Africa, two Maguari Storks (*Dissura maguari*), two Snowy Egrets (*Ardea caudidissima*), four Black-pointed Teguxins (*Tupinambis nigropunctatus*), four South American Rat Snakes (*Spilotes pullatus*) from South America, two Brazilian Cariamias (*Cariama cristata*) from Brazil, deposited; a Black-winged Peafowl (*Pavo nigripennis*) from Cochin China, purchased; a Great Bird of Paradise (*Paradisaea apoda*) from the Arrow Islands, received in exchange; a Brindled Gnu (*Connochaetes taurina*) born in the Gardens.

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OUR ASTRONOMICAL COLUMN.

THE SUNSPOT CURVE AND EPOCHS.—The great importance of collecting as many facts as possible regarding solar activity, and revising them from time to time as new information is gathered, is clearly shown by the paramount rôle that the sun plays in causing the numerous variations in meteorological phenomena. Wolf's relative numbers have been, and are now, so commonly used when reference has to be made to solar activity that it is of the first importance that such a series of values should be as near correct as possible. It is with great satisfaction, therefore, that we note that Wolfer has so diligently continued the useful work, ably begun by Wolf, that he has now published (*Meteorologische Zeitschrift*, May, 1902) a new set of values carefully revised and brought up to date. As he remarks, an examination of the original manuscript at the observatory with various published tables has shown that a great number of differences and printer's errors have crept in, suggesting that it is time that a new edition was published. This reduction has been very carefully made by Wolfer and his assistant, each making the computations twice. In addition to the observed relative numbers, the paper gives smoothed relative numbers, while a third table shows the epochs of maxima and minima with their corresponding weights; the addition of the weights to the dates of these epochs is a very valuable piece of information which will add to the utility of the earlier epochs.

METHOD OF OBSERVING ALTITUDES AT SEA DURING NIGHT-TIME.—In a paper read before the Royal Dublin Society, Prof. Joly introduced recently a method for observing the altitude of a celestial body at sea which may prove extremely useful for taking bearings at night-time or when the horizon is obscured. Assuming that the vessel is provided with the usual Board of Trade rescue signals, one of these is perforated and dropped overboard. This will furnish a bright white light visible in clear weather up to five miles, and burning for about half an hour. To the signal is attached a suitable sinker, so that it will not drift appreciably. Selecting a star, the observer takes its bearing and then alters his course to the opposite bearing, thus bringing the star right astern. The signal is then dropped overboard, and at the same time a reading of the log is taken. After the vessel has travelled a distance of about a mile from the signal, as indicated by the log, the observer takes the angular elevation of the star over the signal, using the sextant in the usual manner. Corrections will have to be applied for the relative motion of the star from east to west at the rate of 1" in four minutes of time, for the larger angle of "dip," and also for the state of the water surface. In very rough water this last correction becomes of special importance, and formulæ with reduction tables are given to show the influence of waves of varying heights. The routine to be followed in observing two altitudes for a "Sumner" position is also described (*Scientific Proceedings of the Royal Dublin Society*, vol. ix., n.s., part v., No. 46, pp. 559-567).

LIQUID FUEL FOR STEAM PURPOSES.

THE possibility of burning a liquid fuel with very great advantage in most circumstances as compared with a solid fuel has been so long recognised that it is astonishing the practice has not been more generally adopted. The success which has been gained in the last few years, however, will undoubtedly lead to a greatly extended use in the near future.

Naturally the choice of a fuel for steam raising is not altogether dependent upon the evaporative efficiency and other advantages which a particular one may possess, but will, of course, be largely influenced by relative market prices, and this, no doubt, has had considerable influence against the adoption of liquid fuel on a large scale in this country. The fuel natural to the locality will always have great advantages over an imported fuel, and England, having such valuable coal supplies to hand, whilst on the other hand having no great natural sources of liquid fuel, gives preference to that material which renders it most independent of outside supplies. Although gas tar and oil gas refuse may be frequently employed in a very economical manner, yet there is little doubt that with a greatly extended use of liquid fuel the prices of suitable bye-products would be so enhanced that imported liquid fuel would remain practically in possession of the field.

For this reason engineers who have perfected the methods of